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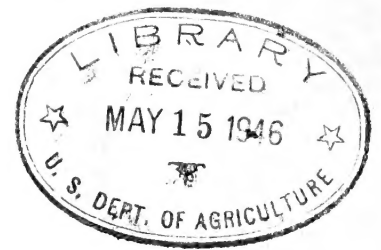
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The EXTENSION ENTOMOLOGIST



The Section of Extension, American Association of Economic Entomologists, which meets in Indianapolis, Ind., December 28-30, is planning an interesting session under the leadership of T. H. Parks, chairman, and L. H. Shropshire, secretary. A copy of the program appears in this issue. It is hoped that the time consumed by discussion leaders will be brief and that there will be ample time for group discussion.

Give thought to the various topics and come prepared to enter into the discussion. Let us make this our best meeting.

M. P. Jones
M. P. Jones
Extension Entomologist

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE AND
EXTENSION SERVICE, COOPERATING



ENTOMOLOGICAL EXTENSION

The Section of Entomology, American Association of Economic Entomologists, which meets in Indianapolis, Ind., December 29-30, is planning an entomological session under the leadership of J. W. Lewis, chairman, and J. H. Brundage, secretary. A copy of the program appears in this issue. It is hoped that the time consumed by discussed features will be brief and that there will be ample time for group discussion.

Give thought to the various topics and items presented in order into the discussion for its own sake and for your benefit.

W. J. Lewis
 J. W. Lewis
 Chairman, Entomologists

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SECRET

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1. The first part of the document discusses the current situation in the region and the impact of the recent events. It highlights the need for a coordinated response and the importance of maintaining communication channels.

2. The second part outlines the proposed actions and the roles of the various stakeholders involved. It emphasizes the need for flexibility and adaptability in the face of changing circumstances.

3. The third part provides a detailed timeline of the proposed activities and the expected outcomes. It also includes a risk assessment and mitigation strategies to ensure the success of the operations.

4. The fourth part discusses the logistical requirements and the resources needed to support the proposed actions. It identifies the key areas of concern and the steps to be taken to address them.

5. The fifth part concludes with a summary of the key points and a call to action. It urges all parties to work together in a spirit of cooperation and mutual respect to achieve the common goals.

THE EXTENSION ENTOMOLOGIST

INTRODUCTION

Apparently the information contained in The Extension Entomologist appeals to other entomological workers, judged by the number of requests to be placed on the mailing list. It is desirable to limit distribution as much as possible, but arrangements have been made to place each field station of the Bureau of Entomology and Plant Quarantine on the list. In this way, The Extension Entomologist will serve groups of workers rather than a few, as when mailed to individuals.

SOURCES OF MATERIAL

Dr. R. W. Leiby, extension entomologist, has prepared a brief story on the Weekly News Letter used in New York State to circulate information on insect pests and plant diseases. County agents cooperate very readily in furnishing information for the news letter because it presents the situation existing in various counties and assists each agent in directing his program. Only enough county reports are included to give an idea of the type of information county agents submit.

An attempt has been made, through circulating a questionnaire, to ascertain the amount of extension work in entomology being done in the various States in addition to that done by extension entomologists. A report of this survey appears on page 4.

Excerpts from a few more annual reports are included in this issue for your careful consideration.

PERSONNEL

Delaware. - On October 15, Mr. J. M. Amos left Lafayette, Ind., to become extension entomologist in Delaware, succeeding Dr. Paul Rice. Dr. Rice resigned September 1.

Louisiana. - Mr. C. O. Hopkins, formerly extension entomologist in Louisiana and for the past 5 years county agent in Louisiana, is devoting 1 week per month to emergency insect control problems and to supplying timely news articles in the capacity of part-time extension entomologist.

U. S. Department of Agriculture. Dr. P. W. Annand, formerly Chief of the Division of Cereal and Forage Insects has been appointed Special Research Assistant to Mr. L. A. Strong, Chief, Bureau of Entomology and Plant Quarantine.

Mr. C. M. Packard, formerly in charge of the Lafayette, Ind., Station has been brought in to the Federal office to succeed Dr. Annand.

Because of the large amount of insect-control work during the summer, several States were obliged to employ special assistants. The names of the men who served in this capacity and worked in more than one county in a State, follow:

Grasshopper Control

<u>State</u>	<u>Name of worker</u>
Colorado.....	Harold Willis
Idaho.....	Robert E. Miller
Illinois.....	William E. McCauley
Kansas.....	R. M. Portman
Missouri.....	(Herbert Koch (Harold W. Smith (C. H. Griffith
Montana.....	(E. Hastings (D. J. Pletsch
Nebraska.....	Dean E. Eckhoff
North Dakota.....	Oscar Pearson (Oren Eastep
Oklahoma.....	(J. Myron Maxwell (H. T. Rainwater
South Dakota.....	U. Norgaard
Texas.....	Charles H. Gable

Mormon-Cricket Control

Colorado.....	Martin M. Poyner
Idaho.....	Keith E. Evans
Montana.....	O. B. Hitchcock (Herbert Jensen
Wyoming.....	(Lee Richards

General Work and Grasshopper Control

Wisconsin.....	(H. L. Chada (Frank Jordan
Wyoming.....	(Margaret Greenwald (Robert H. Hawkins

In addition to these men there were a number of others appointed as assistant county agents to assist with various control campaigns. Entomologists in various other positions necessarily devoted much time to the extension type of work. The information in table 1 is based on replies to the questionnaire sent out in August. States whose names are not included in this table either did not reply to the questionnaire or had nothing to report.

Summary of Questionnaire

When making up the aforementioned questionnaire, it was realized that a line should be drawn somewhere. It was decided therefore to include only the entomologists having to do with extension, research, and teaching, in the various colleges. This group excludes many inspectors, whose duties, in some States, correspond closely to those for extension work. (See page 4.)

ANNOUNCEMENTS

Annual meetings.

American Association of Economic Entomologists, Lincoln Hotel, Indianapolis, Ind., December 27-31, 1937.

National Codling Moth Conference, Spokane, Washington, January 26 and 27, 1938.

Cotton States branch meeting, American Association of Economic Entomologists, Jung Hotel, New Orleans, La., February 3-5, 1938.

Meeting of the Texas Entomological Society, Houston, Tex., February 24-26, 1938.

North Central States branch meeting, American Association of Economic Entomologists, Columbus, Ohio, March 3-4, 1938.

SPECIAL ARTICLES

The New York State Weekly News Letter

By R. W. Leiby

Extension Entomologist

N. Y. State College of Agriculture

The New York State Weekly News Letter is issued regularly each Monday from early March until the first of September by the Departments of Entomology and Plant Pathology of the College of Agriculture at Cornell University.

The news matter in the letter concerns fruit and vegetable insect and plant pests and includes (1) brief, timely articles concerning pests, insecticides, fungicides, spray machinery, etc., prepared by research workers and extension specialists; and (2) notes on the appearance and destructiveness of insects, their diseases, and control measures being followed, etc. Material for publication in the letter is mailed each Saturday by county agents and other field cooperators to the Department of Entomology, where it is edited and assembled in news-letter form. The Letter is then immediately mailed to all county agents and cooperators. Each supplement to the Letter concerns a specific insect.

County agents and others use the News Letter data and its supplements as the basis for timely information sent by letter and postcard to mailing lists of fruit and vegetable growers. Some of the information also is passed on to growers by telephone.

Table 1.--Summary of Personnel in Extension Entomology, Calendar Year 1937

States	Extension appropriation set up in budget		Extension appropriation not set up in budget		Extension travel station or college salary		Specific appropriation for Mormon-cricket or grasshopper control		Extension work by college or station men on college or station funds		Total	
	Men	Weeks	Men	Weeks	Men	Weeks	Men	Weeks	Men	Weeks	Men	Weeks
California	1	48	7	54	1	2	7	44	7	44	7	44
Colorado									2	4	13	116
Connecticut	2	44							9	8	2	8
Delaware	1	12			6	9					7	44
Florida	2	24	1	4						6	4	21
Idaho							1	16	6	66	7	34
Illinois	1	48									1	82
Indiana	3	91					1				3	48
Iowa	1	48									2	91
Kansas	3	60			4	14	1	22		7	2	70
Maryland	1	48									4	67
Michigan	1	48									6	65
Minnesota	1	48									1	48
Missouri	1	48	1	4	1	4	1	18			3	70
Montana			1	8							7	174
Nebraska	1	48									2	68
New Jersey					3	20	1	20	7	48	7	48
New York	3	144									6	164
North Carolina	1	48									1	48
North Dakota	1	48									2	60
Ohio	2	60			1	3	1	12			3	63
Oklahoma	1	48	2	51	2	3		26			6	128
Pennsylvania	4	192									4	192
South Carolina	1	48									2	49
South Dakota	1	16	1	16						1	2	32
Texas	1	48									2	60
Utah			3	24							2	50
Wisconsin	1	48	1	24	10	58	2	23	1	3	6	82
Wyoming							4	60			4	50
Total	33	1,219	17	185	28	113	19	255	37	315	134	2,087

The News Letter was started by the late Prof. C. R. Crosby in 1920 as a food production and conservation measure during the War. For some years, the "reporters" to Professor Crosby's office were graduate students in plant disease and insect subjects. Such students were appointed for the summer and stationed in some of the county agents' offices. However the work of reporting at regular intervals to the News Letter headquarters was gradually assumed by the county agents and their assistants, many of whom are now well versed in either fruit or vegetable pests.

The county agents are held responsible for the type of information they assemble from the News Letter and pass on to growers in their county. Their judgment in selecting data suitable to local county conditions is final. The responsibility of the subject-matter specialists ceases when the News-letter has been distributed to the agents.

During the 1937 season each News Letter and supplement consisted of from 2 to 11 single-spaced mimeographed pages. For the current season, to September 7, it included 174 pages.

County agents have learned to depend upon the News Letter, and those actively interested in sending out information taken from it to their farmers, also are interested and regular contributors. They could not do without it.

The News Letter contains information, which is used by the university publicity bureau through the press and radio; the insect and plant-disease surveys issued monthly by the United States Department of Agriculture for the benefit of entomologists and plant pathologists also contain some of the News Letter information.

The supplement to the News Letter is a service started recently. It also is being sent to county agents. Each supplement, issued at irregular intervals, concerns one insect, its habits and control. Mats showing the stages of insect growth and perhaps the type of injury involved, are usually available with the supplement. This type of information is used regularly by the agents in the monthly issues of their agricultural information periodical, "The Farm Bureau News." The supplement is also released to the press of the county and sometimes mailed as special articles in mimeographed form to farmers in the county.

A sample of the News Letter follows.

Ithaca, N. Y.

New York State College of Agriculture
Departments of Entomology and Plant Pathology

Weekly News Letter Concerning Insect Pests and Plant Diseases

May 17, 1937

Insect Notes - Ithaca

The following observations were made in the Reddick orchard May 16.

Rosy aphid, first generation from the stem mothers observed. Leaf roller, green fruitworm, and cankercworm larvae, and nymphs of the white apple leafhopper also observed. McIntosh buds are generally separated in the cluster with earlier varieties showing an occasional open blossom.

Redbug control.

Limited experiments in 1936 using pyrethrum for the control of redbugs showed considerable promise. Occasionally growers are encountered who find it impossible to use nicotine sulfate without becoming ill. The use of pyrethrum might be suggested to these men on a small scale in an experimental way.

Two pounds of pyrethrum (finely ground flowers) are used to 100 gallons of the spray mixture. Experiments in 1936 involved the use of this material in combination with spray lime. Experiments are under way this year using the pyrethrum in combination with lime sulphur and wettable sulphurs. -- P. J. Chapman, Geneva.

Apple scab - Hudson Valley.

We have had a 36-hour rain period during bloom which will no doubt result in scab and rust infection on unsprayed trees. There was a heavy discharge of scab spores, and some leaves examined showed about 50 percent of the perithecia missing (entirely blown away). However there are many small perithecia ready to mature spores for the next rain.

Scab infection in southern Dutchess County was found May 10-11 which was probably initiated during the rain of April 27 and 29 during the green tip stage. Trees which received the delayed dormant spray May 1 did not show infection. - H. D. Palmiter, Poughkeepsie.

Insect Notes Submitted by the Hudson Valley Staff

Redbug eggs began to hatch about May 5 in the vicinity of Poughkeepsie. The hatch was complete on May 10. Leaf rollers started hatching about May 4 in the vicinity of Kinderhook. The hatch of this insect was from 90 to 100 percent complete on May 10. Hatching of overwintered red mite eggs was

practically completed by May 10. Some white apple leafhopper nymphs were noted in orchards in the vicinity of Poughkeepsie, May 6. Codling-moth pupae were first noted on May 10. Emergence of the earliest moths is expected about May 20. Scurfy-scale eggs began hatching about May 11. Today, May 15, about 20 percent of the eggs have hatched. Eggs of the gooseberry fruitworm were first noted on currants May 12. No larvae have been observed to date, May 15. - O. H. Hammer, Poughkeepsie.

The reports from the various counties have been summarized as follows by J. A. Evans and W. D. Mills.

Orange County (R. W. Tousey).

Weather has been fair most of the week with temperatures that pushed all remaining varieties into full bloom. Petals on McIntosh and earlier varieties began to fall about May 12. Red bug is quite prevalent throughout the county. Leaf roller is present in most orchards, but a problem in only a few. Pear psylla nymphs, and pear thrips were first seen on May 10, but apparently had started hatching a day or two earlier. Plum curculio was found on May 12. There were showers throughout the county on the afternoon of May 13, and about dark it started raining steadily and continued throughout the night and all day on the fourteenth.

Columbia County (S. R. Shapley).

Some early orchards of McIntosh came into bloom over the week end of May 8, but as far as the county as a whole is concerned McIntosh did not come into full bloom until about May 12 or 13. Frost occurred the morning of May 11, and in general I think it did very little damage. Very light showers occurred during the day of May 13. I do not think they were heavy enough to start scab shooting. However, a hard shower occurred about 10 p.m. on the thirteenth and settled into a rain, and it has rained almost continuously up until the time of this writing (10 a.m., May 15). When the rain started temperatures were around 60 degrees, but dropped to around 50 by noon on the fourteenth, and by night were down to about 42 degrees. The rain developed the telial horns of apple rust so they were out a good inch and remained that way all day May 15 and up to the writing of this report. General pollination weather has been poor with the exception of May 12, when it was fair. Pear blossoms are dropping their petals and quite a few pear-psylla nymphs in the first stage. There are many eggs that are unhatched. The petals were nicely off on many sweet cherries; May 11 and on May 13 the shucks were beginning to fall in the same orchards. Very few cherry growers have applied their shuck spray as May 13 was the first chance and it has rained since then. Strawberry weevils were active the first of the week in some beds.

(Several other counties reported, but this is enough to give an idea of the type of information pertaining to fruit.)

Vegetables

Cabbage-maggot control.

The flies are not yet out in numbers, although a few stragglers appeared early in the week of May 2 during the warm weather that prevailed at that time. No eggs have so far been observed. Emergence has been held up by the cool, wet weather of the past few days, but the flies should begin to appear in numbers the next warm bright day and egg laying must be expected shortly after this.

Control measures should, in general, be started both in the seedbed and on early-set plants sometime from the tenth to fifteenth, depending on the weather.

It should be remembered that egg laying may commence several days earlier on gravelly soils or where there is a warm, south exposure than in less favored localities, and in such situations the grower should be prepared to start treating somewhat earlier than generally recommended.

Flea-beetle injury was observed on May 1 in early seedbeds and should be watched for on warm, bright days and control measures should be applied where serious damage is threatened. - Hugh Glasgow, Geneva, May 7.

Cutworm control

Cutworms are apt to appear at any time. The poison-bait formula is bran, 20 pounds; paris green, 1 pound; molasses, 2 quarts; oranges or lemons, 3 fruits; water enough to make a moist mash (about $3\frac{1}{2}$ gallons). The bait is more attractive to cutworms when moist. Small boards or shingles laid on the ground among plants are often good traps for the worms. A cylinder of tar paper or cardboard around the base of a plant will often protect it from cutworm attack. - R. M. Leiby, Ithaca, May 7.

Cutworm bait. -- Based on field trials during the past season, commercial sodium fluosilicate has given encouraging results for cutworm control. The sodium fluosilicate was used at the same rate as paris green and mixed according to the standard formula. According to observations in several western New York counties the sodium-fluosilicate bait gave equally as good results as the paris-green bait. - C. E. Palm, Ithaca, May 10.

Revised bulletins.

Bulletin 206, The Control of Diseases and Insects Affecting Vegetable Crops, rev. March 1937. Available from Ithaca.

Richmond County (M. B. Linn).

Planting of cabbage, cauliflower, and lettuce was practically completed this week. Many growers have used calomel dust after transplanting for the control of cabbage maggot. Most of this was applied before April 25.

Wire stem caused on the whole very little loss of seedlings in frames and greenhouses. Considerable loss was sustained by growers of lettuce due to Botrytis on seedlings. The total loss is of course undetermined as yet, for undoubtedly many plants bearing primary lesions were transplanted into the field. As usual formaldehyde-treated frames showed as high a percentage of Botrytis as did untreated.

Rockland County (W. J. Clark).

Early sweet corn practically all planted. Growers are treating cabbage with the colomel-cornstarch mixture as it is set out in field for cabbage-maggot control. The first tomatoes were set on May 4 and 5 of this week. The first sweet corn broke the surface May 7.

Onondaga County (W. E. Field).

A total of 2,997 bushels of potatoes were treated at the 3-day potato seed-treating stand at Apulia Station. Of this number, 614 bushels were treated with hot corrosive sublimate and the balance with hot formaldehyde. High temperatures and warm rains, there being a total rainfall Wednesday and Thursday, May 5 and 6, of $1\frac{1}{4}$ inches, have pushed early vegetables along rapidly. Early corn is beginning to come through the ground, and other vegetables are coming along in fine shape. The cabbage-maggot fly is just beginning to appear. Very few eggs have been found to date.

Niagara County (D. M. Dalrymple).

Cabbage-maggot flies were observed May 5 in one protected location. No eggs then. Field planted vegetables appear to be doing very well in cool, moist weather. No tomatoes set as yet, ground too cool and moist. Cutworms were found feeding on early cabbage May 4. Flea beetles had become destructive in one cauliflower seedbed May 4. Tobacco dust will be used freely.

(Other counties gave similar reports.)

R. W. Leiby

Extension Entomologist

Census of Insect Species and Names

Though any figures on the numbers of insect species in existence must be considered estimates only, the following table prepared by the taxonomic unit of the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, is believed to be approximately correct. The data were arrived at after a careful consideration of various factors, and in many cases include actual counts of the species listed in catalogs, and in the Zoological Record for the years subsequent to the appearance of those catalogs. Previously published estimates have been confined to the numbers of supposedly valid species described; however, since the taxonomists must deal with all the names that have been employed, whether valid or synonyms and whether species,

subspecies, or varieties, an attempt has been made to obtain such figures as well. Furthermore, since we have a particular interest in the fauna of North America north of Mexico, separate figures are given for that region. All the estimates may be considered as extending to the end of the year 1936.

Insect species - estimated totals, 1936

Insect orders	World fauna		Nearctic fauna	
	Names	Recognized species 1/	Names	Recognized species 1/
Anoplura.....	280	250	35	30
Coleoptera.....	331,200	248,800	30,700	25,600
Collembola.....	1,200	1,100	280	250
Corrodentia.....	960	875	110	95
Dermaptera.....	1,350	1,050	20	15
Diptera.....	89,700	73,000	19,000	15,000
Embioptera.....	140	115	4	4
Ephemeroptera.....	1,400	1,270	580	507
Hemiptera.....	55,300	48,000	10,900	7,400
Hymenoptera.....	118,000	102,000	19,500	16,700
Isoptera.....	1,700	1,600	65	59
Lepidoptera.....	146,000	105,000	15,000	10,500
Mallophaga.....	2,800	2,500	380	300
Mecoptera.....	360	310	75	65
Neuroptera.....	4,650	4,350	310	275
Odonata.....	5,000	4,500	480	400
Orthoptera.....	25,000	21,000	1,900	1,150
Plecoptera.....	1,500	1,260	280	230
Protura.....	60	50	25	20
Siphonaptera.....	1,050	900	300	260
Thysanura.....	300	270	40	30
Thysanoptera.....	2,800	2,500	500	450
Trichoptera.....	4,500	3,500	600	500
Total.....	795,250	624,300	101,084	79,840

1/ Does not include subspecies and varieties, except in the case of the ants (contained within the Hymenoptera).

The above figures cover only the Insecta. Mites and other arachnids are not included. The only estimates at present available for the Acarina indicate approximately 16,000 recognized world species, with about 1,600 known from North America north of Mexico.

EXCERPTS FROM STATE ANNUAL REPORTS

Illinois

Entomology extension work in Illinois has been carried on, as in the past, by members of the research staff of the State Natural History Survey Division and Illinois Agricultural Experiment Station. This staff consists of the following members: J. H. Bigger, S. C. Chandler, C. C. Compton, M. D. Farrar, W. P. Flint, and L. H. Shropshire.

The above-mentioned arrangement has made it somewhat difficult at times to hold the desired number of field demonstrations or meetings, and has to some extent interfered with the carryong on of our regular research projects. On the whole, however, we feel that the extension work has been carried through in a fairly satisfactory manner, especially with regard to control campaigns or field demonstrations.

Another extension activity of the summer months is the spray service furnished orchardists. As in the past, this service has been available to all orchardists of the State from late March till the first of September. Data from the following sources has been assembled each Friday afternoon at Urbana:

The Federal Deciduous Fruit Insect Laboratory, Vincennes, Ind.

The Indiana Agricultural Experiment Station at Lafayette, and its field stations at Mitchell and Orleans.

The Missouri Agricultural Experiment Station at Columbia, Mo., and its field stations.

The Illinois field stations of the State Natural History Survey Division, as well as

From some 20 cooperating orchardists.

These data are summarized and statements concerning the development of insects and diseases for the week, the probable best dates for applying sprays, the sprays to use, are then sent by special letter to all farm bureaus in counties where fruit growing is important. The statement is given to the daily press through the extension editor's office, and put out over the air during the week by some 20 radio stations in Illinois, Missouri, and Indiana. This service has been much appreciated by orchardists and is used generally in Illinois.

A number of meetings have been held with florists' groups and organizations. Many of the greenhouses in the State have been visited, and Mr. Compton has maintained contacts with all the leading greenhouse and florists' organizations. His services have been greatly appreciated, as shown by numerous statements received from florists and officers of different organizations.

Extension work in truck-crop insect control has been carried on through the medium of a number of meetings in the principal truck-crop growing areas near St. Louis, East St. Louis, Rock Island, Peoria, and Chicago.

Illinois (Contd.)

Demonstration meetings have been held on the Cook County truck experiment field. These meetings have always been attended by several hundred growers. Truck growers' schools have also been held in the principal truck crop areas and Mr. L. H. Shropshire of the survey staff, who is working principally on truck-crop insect control, has given talks before meetings of the State Vegetable Growers' Association and the Illinois State Horticultural Society.

Some extension work has been carried on with the animal-husbandry department, especially with the veterinary and poultry sections.

Iowa

Summary of results.

County-wide insect control campaigns were conducted in 36 counties. In 84 counties, 8,900,000 pounds of poison bran were used to control armyworms, grasshoppers and cutworms, a total of 10,000 gallons of creosote was used to control chinch bugs. A total of 40,000 persons used this material (poison bran and creosote) to control insects. The value of crops saved from chinch bugs, armyworms, grasshoppers, and cutworms alone would be \$3,000,000. Chinch-bug damage was greatly reduced by crop planning which was not included in the above figure. The damage to orchards, gardens, household by insects attacking farm animals, rodents, and truck-crops insects was greatly reduced. The entire insect control program saves Iowa several million dollars annually.

Field-crop insect control.

The successful control of insects depends upon the farmers' knowledge of entomology and his ability to apply control at the proper time and in such a way that it will give results in his particular incident. If we expect to train or give farmers the knowledge necessary to control major insect pests, it will require several years of extensive teaching. The successful control of an insect requires that one know its life history habits, is capable of appraising the bug situation, and knows when and how to apply a control. It can, therefore, be seen that each county in Iowa should conduct an insect school annually, so that the farmers may be trained to control insects prior to their actual appearance in damaging numbers.

Methods of conducting projects.

The campaign was preceded by a thorough survey in the counties that seemed likely to be heavily infested with grasshoppers and chinch bugs and the findings of this survey served as a motive for starting the control meetings and publicity. These educational meetings had as their objectives selling the people on the need for an organized campaign, setting up an organization in the counties and townships, convincing the farmers of the value of control and to induce a maximum number of them to keep damage down to a minimum. All of this was necessary because the problem was new to most Iowa farmers.

Iowa (Contd.)

It should be noted that with the exception of a small area in the southern part of the State in 1922-24, Iowa had been entirely free of chinch-bug losses from 1902 until the present outbreak. Grasshoppers have not been a serious pest in southern and western Iowa since 1894.

The educational program was started in district county agent schools at which the chinch-bug and grasshopper problem, organization, and methods of control were discussed and tentative plans were made for county campaigns. These schools were followed by winter meetings which were set up by the county agents in each county. This was a county-wide meeting, and the agent made a strenuous effort to get two farmers from each township and the Smith-Hughes instructors to attend the meeting. In this way, the nucleus of an organization in each township was assured. Following the winter meeting, the county agent, Smith-Hughes instructors, and local leaders discussed the problem with smaller groups and gave the information to the farmers in each township. In this way, interest was developed and the way was paved for a successful second meeting to be conducted in April, May, or June. At the latter meeting, the results of the spring survey were given, the importance of the problem was emphasized, control methods were fully explained, local cooperators were selected, and the names of the farmers on whose farms model barriers and control demonstrations would be conducted were announced.

The educational meetings were supplemented by timely newspaper articles, educational exhibits, and radio talks. In preparing news articles, an effort was made to have a weekly story in all county papers which would contain some current information on the local situation. The radio talks were usually of the open-forum type and answers were used. Educational exhibits were found to be a splendid means of getting information to the farmers. These exhibits created interest and often sold the farmers on the value of the program.

Minnesota

General comments.

Criticism of past campaigns:

The main criticism of past control campaigns has been that bait materials have not been on hand in time to do the job effectively. I do not believe we need hesitate when we say that this has been the main criticism, and it has been a very serious criticism which we have not been completely able to justify in all cases.

Missing link to successful control campaigns:

Now, while the situation is still fresh in the minds of all concerned including government officials, it seems to be the opportune time to establish permanent storage houses where bait still will always be on hand, or at least we should guarantee ourselves some source of supply which will be

Minnesota (Contd.)

available within a few hours of the time of notice of an outbreak. Such supplies should be within a short distance of the areas usually infested with grasshoppers. Possibly large central warehouses or manufacturing plants located in railroad centers and operated by the Federal Government would be the answer, or one or more warehouses located in the various "hotspot" areas of the various States would be desirable. Possibly contracts can be carried from year to year with certain milling or mixing organizations whereby prepared grasshopper bait could be turned out within a very few hours for shipment to infested areas.

Millions of dollars saved warrants expenditures:

At any rate, when we in Minnesota can show a saving of crops from the year of 1931 to 1934 of twenty-eight million dollars due to grasshopper-control activities, we certainly should be able to muster up support enough to establish what we might call the last missing link in the control program. It is not necessary to have large quantities of bait on hand in preparation for immediate use, but enough material is necessary to tide over that period when so much more can be done with the ton of bait than can be accomplished by the same ton 2 or 3 weeks later.

A stitch in time saves nine:

There is an ideal time for spreading the bait for controlling grasshoppers and that is when the bait is worth several times as much in the hands of the farmer than it is later on in the season, even 5 or 10 days later. The cost of this preparation insurance should be an extremely small item as compared with the tremendous losses which occur due to delayed spreading of bait.

TIMELY TOPICS

The Value of Birds in Grasshopper Control

C. C. Wilson, Sacramento, states that in San Luis Obispo County further study of the effect of birds in the reduction of the grasshopper population showed for the western crow, 15 per bird, with a maximum of 28 pairs of grasshopper mandibles; for Brewer's blackbird, $12\frac{1}{2}$ hoppers per bird; for lark-sparrow (nestling), 12 hoppers; for California horned lark, $1\frac{1}{2}$ hoppers each. The horned lark, crow, and blackbird were more numerous on the area studied, and the crow and blackbird may be considered a definite factor in the reduction of grasshopper population in May and June. These observations were made in cooperation with Johnson A. Neff, of the Bureau of Biological Survey.

Insects in Skunk Droppings

H. C. Mason and B. J. Landis, of the Columbus, Ohio, laboratory, report that an examination of skunk droppings which measured approximately $1\frac{1}{2}$ inches long by $\frac{1}{2}$ inch wide, collected in a bean field at South Point, Ohio, during June 1935, disclosed the remains of a total of 409 adult insects, including: Epilachna varivestis Muls., 6; Ceratomegilla fuscilabris Muls., 1; Hippodamia convergens Guer., 1; Elateridae, 9; small Coleoptera, 22; Rhynchophora, 1; Carabidae, 3; large Coleoptera, 1; Orthoptera, 1; and small Hymenoptera, principally ants, 364.

Poison Bait for Slugs

C. T. Gimmingham, British Ministry of Agriculture and Fisheries, and H. C. F. Newton, Harper Adams Agricultural College, report in the Journal of the Ministry of Agriculture (June) on a new type of poison bait for destroying slugs and snails. It is a mixture of metaldehyde and bran. The bait is prepared in the same manner as a paris-green bait. "In a large-scale field experiment in April," they report, "over more than an acre, on which the bait was broadcast in the manner recommended for paris-green bait, counts on 64 separate square feet areas across the middle of the field gave an estimated 'kill' of slugs of some 50,000 per acre and of some 70,000 per acre from counts on 44 square feet areas nearer the hedges. Similar figures were obtained on another smaller-scale field trial. The bait seems attractive to all the common and destructive species of slugs, and snails also are reported to take it readily...The bait remains attractive to slugs for a considerable time if protected from heavy rain...The figures given for the numbers of slugs killed under different conditions cannot be taken as indicating any real differences between the efficiency of the various strengths required. More detailed experiments on these points are required and it is hoped that they will be undertaken..."

New Form of Paris Green

On May 11, 1937, the U. S. Patent Office granted F. E. Dearborn, of the Division of Insecticide Investigations, Patent No. 2080004 covering

certain new compounds containing copper, arsenic, and organic acids. These new compounds are closely related to paris green in that the acetic acid of paris green is replaced by an unsaturated acid such as crotonic, oleic, and erucic. These new compounds are greenish in color. They are superior to ordinary paris green in that the water-soluble arsenic content is very low.

White Arsenates for Agricultural Insecticides to be Colored Pink to Identify Them as Poisons

With a view to preventing possible cases of poisoning, white arsenates--such as lead arsenate and calcium arsenate--which are universally used as agricultural insecticides will be given a distinctive pink color, under a voluntary agreement of the producers of these chemicals, it is announced at the offices of the Manufacturing Chemists' Association, Washington, D. C.

Agricultural News Letter,
E. I. du Pont de Nemours & Co.,
Wilmington, Del.

Methyl Bromide as Fumigant

Methyl bromide has been successfully applied as a fumigant by the California State Department of Agriculture. Used first as a treatment to destroy tuber moth in California potatoes, it enabled the shipment in the first year of 235 cars which otherwise would not have been permitted to move. It was then used with equal effectiveness to destroy pinworm in tomatoes. And it can be employed to kill the vegetable weevil in celery, to free Cuban pineapples of mealybug infestation, and to destroy Japanese beetles in green vegetables such as peas, snap beans, tomatoes, eggplant, and green corn. Recently the gas has proved effective in destroying cheese mite in cheese factories. The new fumigant is now being tested on sweetpotato weevil, apple maggot, European corn borer, Indian pod borer, and many other pests. (Food Industries, September.)

Magnesium Sulphate as Insecticide

Neale F. Howard, Bureau of Entomology and Plant Quarantine, says in a letter to Science (vol. 86, September 24): "A recent article in Science (85, 1937) would indicate 'that $MgSO_4$ used as a spray, in the proper concentration, constitutes an effective control for the Mexican bean beetle (Epilachna varivestis Muls.).' About 10 years ago a report became current that magnesium sulphate, $MgSO_4 \cdot 7H_2O$ (Epsom salt) was satisfactory for the control of the Mexican bean beetle, and large quantities of it were sold in several Southern States...Recently this material was tested by R. A. Fulton in the Columbus, Ohio, laboratory of the Bureau of Entomology and Plant Quarantine. When bean foliage was treated with dosages 100 times as great as the dosage of calcium arsenate which is fatal to the larvae of the Mexican bean beetle, no effects on larvae placed on the foliage could be detected. The larvae fed on the treated foliage, consumed as much leaf area as the larvae placed on untreated

foliage and molted successfully...One entomologist suggested that the reason some growers believed that benefits had resulted was that the larvae which were devouring the plants pupated shortly after the spraying, and that when observations were made the quiescent pupae only were present. The growers, not being familiar with the biology of the insect, decided that the treatment had killed them, since they were unable to move."

Magnesium Sulfate--An Unsatisfactory Substitute for
Arsenicals in Grasshopper Baits

Wide publicity was given to a short note by Hubert W. Frings and Mable S. Frings which was published in Science (vol. 85, April 30, 1937) in which a formula with from 20 to 25 percent magnesium sulfate (Epsom salts) was recommended as being as effective as 5 percent arsenic in grasshopper bait. The communication was printed under "Discussion" and the authors stated that "since there were neither time nor facilities to make complete tests, the results are only preliminary."

The substance of this article was published by Science Service and was widely copied by newspapers. As a result, many farmers throughout the central West used Epsom salts in grasshopper baits, but in every case so far reported unsatisfactory results were obtained.

* * * * *

A survey of the literature offers little evidence that magnesium sulfate has any value as an insecticide whatsoever. There is not a single really impressive field control demonstration recorded. The small test by Hawkins against the wheat wireworm mentioned by the Fringes was apparently not regarded as significant by him, for he drew no practical conclusions from it.

The action of magnesium sulfate on the lower animals is primarily anesthetic. There was no cathartic action observed on the grasshoppers.

It is unfortunate that the extensive publicity on the supposed value of Epsom salts resulted in widespread use of a material that appears to be ineffective for the purpose. It is serious, because many persons may have their faith in the standard-bait method weakened. At the present time, only sodium arsenite, white arsenic, gray or crude arsenic, paris green, sodium fluoride, and sodium fluosilicate in baits have given anything approaching satisfactory control of hoppers. For the present at least, Epsom salts cannot be recommended as a satisfactory control for any insect.

Roger C. Smith,
Kansas Agricultural Experiment Station,
Manhattan, Kans.

(Taken from Science, volume 86, September 3, 1937.)

Beetle in Belgium

"Thanks to the strenuous efforts made by the Belgian Ministry of Agriculture, the progress of the Colorado beetle in Belgium appears to have been checked and every effort is being made to prevent any reappearance of this pest of potato fields," says the Gardeners' Chronicle (London, June 5). "* * * Colored illustrations of the beetle in all its various forms are posted in every municipal office throughout the country so that everyone knows what to look out for * * * Anyone finding a specimen of the pest is obliged, on pain of a heavy fine, to notify the burgomaster of his district; the burgomaster then wires to the Ministry of Agriculture. As regards Holland, the beetle has not yet been noticed there, but the greatest anxiety is felt lest, having been found in Belgium, it finds its way over the frontier of the border provinces..."

Mosquitoes Via Airplane

"The quick passage of airplanes from South American countries to the United States and the specific possibility that mosquitoes infected with yellow fever may be transported in such carriers," says the American City (July), "make it necessary for quarantine officers in domestic ports to keep a sharp lookout for dangerous insect pests. That insects are conveyed in airplanes is now recognized as an actuality and a source of potential danger. During November 1936, for instance, 69 inspections of airplanes arriving from South American ports were made by officers of the U. S. Public Health Service at Miami, Fla. In 45 instances no insects were found. However, during the course of 24 other inspections, 53 insects were captured while one escaped. In 7 of the 24 inspections 13 mosquitoes were found, 10 being dead. The maximum number of mosquitoes found during a single inspection was 3, of which 2 were dead...While no yellow-fever mosquitoes were discovered on the inspections here reported, such mosquitoes might easily be brought into the United States by airplane unless adequate measures are taken to prevent their importation."

Keep Xmas Trees Green

This year you can go to the drug store and buy three inexpensive chemicals and make a solution which will preserve your Christmas tree, fragrant and green, for the full week of holiday festivities, says Science News Letter (December 19). You can thank Dr. R. H. Carr, professor of agricultural chemistry at Purdue University, for the following directions. Go to your druggist and buy 15 grams of calcium carbonate, 5 grams of citric acid, and 6 grams of malic acid. Mix the last two, which are both liquids, in 3 quarts of water. Save the calcium carbonate until you are ready to set up your tree. Set the base of your Christmas tree in a wide-mouthed gallon bottle or a pickle crock and brace it with small, unnoticed wires. Then mix the calcium carbonate in the citric-malic acid solution and pour it all into the crock. As the tree drinks up the solution, add more water. Hemlock is about the only tree which appears not to be aided by this treatment.

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THE STATE OF TEXAS

1900

IN SENATE, FEBRUARY 15, 1900.

REPORT

OF THE

COMMISSIONER

OF THE GENERAL LAND OFFICE

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